The Michigan Antique Radio Chronicle

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A QUARTERLY WRITTEN FORUM OF THE MICHIGAN ANTIQUE RADIO CLUB

VOLUME 32 Winter2017 NUMBER 4

The Phonograph Issue

Learn how to service your vintage record changer and rebuild a crystal cartridge

THE MICHIGAN ANTIQUE RADIO CLUB

The Michigan Antique Radio Club was founded October 19, 1985 at the Dillon Inn in Lansing, Michigan. Present at this historical meeting to found MARC were Jim and Brenda Clark, Larry Anderson, Karl Rommel, Mike Male, Dick Perry and John Kent. The purpose of the organization is to preserve the history and enhance the knowledge of radio, television, and related disciplines, with special emphasis on contributions originating in the state of Michigan. Dues for membership in M.A.R.C. are $25.00 annually (US funds) and payable in January. Officers of M.A.R.C. welcome your membership, your questions and your personal contributions to enhance the service value, growth and activities of the organization. Terms of office for Board members expire concurrently with the summer EXTRAVAGANZA meet held in Kalamazoo, Michigan. Send Correspondence to MARC, 311 Wordsworth St., Ferndale, MI 48220. E-mail: president@michiganantiqueradio.org. **Visit our Web site at** www.michiganantiqueradio.org.

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Don't forget that our spectacular Winter Meet is coming up on January 27th. See the back cover for details.

This issue has focused on phonographs. If you have any hints or experiences with phonos you would like to share, please send them in to your editor and we'll print them in a future issue.

Perspectives

There are so many reasons I've been happy to be involved in MARC over the years. Our meets are great fun and a great resource for parts and treasures. The contacts and tips I've gotten have been invaluable, as well as the opportunity to meet others who share my interests.

But the best thing about MARC has always been its people; the dedicated members and especially the tireless and hard-working board members, who sacrifice their time, money, effort, sweat and tears to make this club great. It's especially true when one of us hits a rough patch or falls down, and you find that others are there to pick you right up.

I have little cause to complain in my life, but sometimes there are challenges. I've endured the perfect storm this year of health problems, family crises, computer problems and an absolute whirlwind of work and commitments at my day jobs. I'm currently writing this from Japan, on a business trip six and a half thousand miles from home. But I don't have to worry, and you don't have to worry, because the board members have stepped up in my temporary absence and have kept the ship righted and running. Thank you all from the bottom of my heart for having my back.

The good news is that smoother waters are ahead, and I've been far from idle in club matters. I've made contacts with a radio club in Tokyo and with a collector in Saitama (he and his wife graciously hosted me while I was in town) with a fantastic collection. I hope to bring you articles on both in the next issue.

I've also been busy finding a company to help in the redesign of the club website, and think I have a good one. You can look forward to an updated site with more functionality and ease of use, coming soon. Just as soon as I run it by the board...

I also hope you're looking forward to our winter show in Farmington Hills. Last year was a blockbuster and we enjoyed increased attendance by both buyers and sellers, as well as a hopping silent auction and an excellent presentation by John Reinicke. We hope to see you there on Saturday, January 27, 2018 at the Costick Center.

As for me, it's back to work for now. Once more, a giant *doumo arigatou* to the board and I'll see you all soon!

Jeff

NOTES FROM THE SERVICE SHOP

No. 100

by John Reinicke

Art's Record Changer Presentation

© 2017 by John Reinicke

I do enjoy these excursions to Centerburg, even in cold weather. This trip I had decided to visit Art in his shop in the morning and take advantage of the sun to warm the attic for my afternoon exploration of Clem's logbook. As I walked briskly to ward off the chill in the early morning with the sun low in the southeastern sky, I took in the long shadows and the few leaves hanging on the trees. The sky was that intense blue that comes with clear, cold days. I had a mental note to ask Art about his adventure with the FBI that I discovered during my previous visit.

Even with the cold, I had to pause to take in the display Art had arranged in the front window of his shop. There were, as expected, an assortment of radios from the mid 20's right up to the 70's. The unexpected, front and center, was a display of record changers and a late 60's compact stereo. I could see Art sitting at his bench and he had noticed me. He grinned and waved me in.

When I had talked to him the previous evening, he promised to have the coffee on by the time I got there and, indeed, the aroma, as I walked in the door promised a robust cup. I am always interested to see what Art might have on his bench and that usually results in a mutual exchange of information and 'hints and kinks'. This time, I was surprised to see that Art had his laptop on the bench and I could see he was working on a presentation.

I poured myself a cup of coffee and Art warmed up his cup. As usual, we exchanged family gossip and grandparent photos. Finally, my curiosity got the better of me. "OK, so what is up with the laptop? It sure doesn't look like a repair in process."

Art smiled. "No, fortunately no repairs are required. What I am doing is making up a presentation." I waved for him to continue. "The Centerburg Library has just completed a major renovation that includes a rather nice meeting room that can be reserved by any resident for presentations, club and scout meetings or whatever. To introduce folks to the facility and get people to rediscover the library, they are doing a series of presentations all next week. The library committee invited me to do a presentation next Wednesday evening. Just think, I will be just third in line after the bookstore and Jane Heath's presen-

tation on doll's clothing. The nice thing is that all the presentations will be well publicized so I may actually get a good turn out."

I grinned. "OK, so what will you present? I suppose you will want to do one on the history of radio or something along that line."

"Well, I considered that." Art responded with a pensive look. "It would have been fairly easy because I had done a presentation like that in the old library meeting room. It was fairly well attended and well received but this time I decided to change things up a bit and do a presentation on repair of record changers and automatic turntables. Vinyl is hot these days as a lot of people have either rediscovered, or encountered for the first time, the warm mellow sound of a vinyl recording. If you don't mind, I would like to show you that presentation and you could help polish it up."

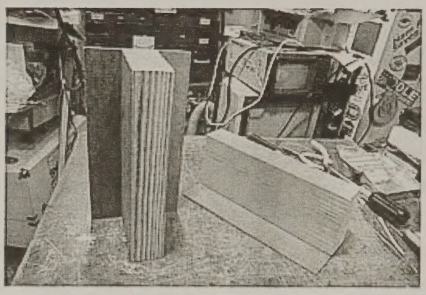
I readily agreed and Art even drug out his projector and screen. Art cleared his throat and began.

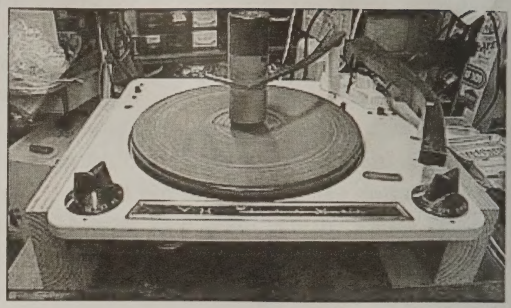
"I want to thank you all for coming tonight. I think you will find this interesting and I want to share some of the things that I have learned such that the handy and more mechanically inclined of you might be inspired to take the challenge and bring one of these wonderful machines back to life.

"First off, we are discussing the repair of record changers and, by extension, the so called automatic turntables of the era. More or less in order, we are going to discuss, why get involved, caveats and warnings, getting started, step by step repairs, and, of course, adjustments, tips and such. Feel free to ask questions or contribute as we go along. Of course, I will take questions and comments at the end.

"The first thought would be: Why do it? After all I am talking about machines that are at least 40 years old and could be 60. I am limiting my conversation to machines that are capable of playing modern vinyl recordings. Repair of machines from the 30's and 40's would be a presentation topic by itself and for the really ambitious, so would the repair of jukeboxes. A lot of the techniques I will present will be applicable, so if one were so inclined, I think you will find them useful.

"Anyway, why do it? First and foremost, vinyl analog recordings really do sound good! Second, there is a vast library of recordings that simply are not available for download. And even if a particular piece is available for download it will likely be a 'remix'. The original vinyl will have the mix that was created by the original artists and will likely be much better. And don't forget, some artists are doing new releases exclusively on vinyl. Third, old record changers are really quite rugged. They were built for thousands of hours of operation and most that you encounter have only a few hundred hours at most. I suspect that they would play continuously for well over ten years and I have never encountered a changer or turntable that would be considered to be 'worn out'. Fourth, old changers are really good record players. You would have to spend many hundreds of dollars to match the quality with a modern unit and in the case of some of the turntables of the 70's there are no modern units that are any better. Fifth, old record changers can be quite reasonable in price. They turn up in yard and garage sales, in second hand shops, and swap meets. Often they will be covered with a layer of grime but don't let a little dirt deter you. While you are shopping don't neglect the "value brands". V-M





Building a service stand

made popular priced changers that really were, and are, quite good. I have found perfectly repairable changers for as little as a buck.

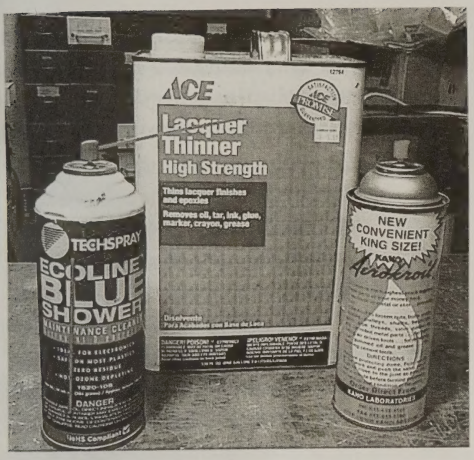
"So you trundle your newfound treasure home there are a few caveats to keep in mind. This activity will expose you to chemicals and surface coatings that are know to the state of California to cause cancer in lab rats. Old changers contain lead and cadmium. The cleaning materials I will suggest are also known to cause problems and, at the very least, require good ventilation.

"When you get it home DO NOT just plug it in to try it out. I can't emphasize this enough. From the late 50's right through the 80's manufacturers used lubricants that might as well have been epoxy. On shafts where it has NOT been exposed to air, this stuff will be very frozen. If the changer has been sitting for a couple of years, and likely it has, these joints will be quite locked. If you try to cycle the changer I guarantee you, you will bend or break something. Never force things – parts can be cleaned but replacements are problematical at best.

"Never use WD-40! WD-40 is just what it says it is - Water Displacement. It is designed to dry metal surfaces and keep rust at bay. It is a lubricant for only a short period of time and then it turns to goo.

"Never use silicon spray. Silicon spray is a good lubricant that will 'creep' and will completely cover a surface. In old record changers it will find it's way onto a friction surface and cause slippage. Once this happens it is well nigh impossible to get it off and restore operation.

"So let's get started. I recommend a well-lit work surface with lots of space. A sheet of tempered Masonite makes for a nice smooth surface. You will need to round up some tools. This will require the 'usual' hand tools such as needle nose pliers, diagonal cutters, an assortment of screwdrivers, a small socket set, open end wrenches and so forth. To this you will need to add some specialized tools such as a set of small precision screwdrivers, nut drivers in both metric and English sizes, a heat gun, a small, bright flashlight or penlight, dental picks, Altoids tins, Q-tips (and you will use a lot



Use the recommending cleaning products

of these) and a camera. I find it handy to have a vice on my bench. In addition to the expected things, I use it to park my heat gun when it is hot to keep the business end out of mischief and away from my fingers. A strobe disk is a handy thing for checking speed unless you happen to have perfect pitch.

"It is handy to have some sort of stand to support the changer while you work on it or do operational testing. For that, I took a couple 2x4's cut to about 9 inches and, for a base, nailed on a 5 x 9 inch sheet of Masonite. These two have proven to be a quite useful stand for record changers of all sizes.

"Rubber rejuvenator sometimes will be helpful, but I wouldn't count on it. It is designed to remove surface oxidation and glazing but these changers have rubber that is hard all the way though. My experience is that it only helps for a day or two if it helps at all.

"And don't forget the most useful tool of all: PATIENCE.

"You will need some useful chemicals for cleaning and lubrication. It should be noted that some of these are flammable and require good ventilation. Techspray "Blue Shower" comes in an aero spray can with one of those little red tubes. Blue Shower is a bit expensive, but it really does a good job cleaning small parts. Don't use Blue Shower on plastics – it will cause some to crumble. Lacquer thinner is a particularly good cleaner for metal parts. Do not use it on any plastics. Lacquer thinner is very flammable and with the right mixture of fumes can be downright explosive. The fumes are really not good for you. Therefore, I always wear disposable gloves and use it in the garage with the door up or use it out on the driveway. Mineral Spirits or common paint thinner is a less aggressive solvent that can also be used to clean old lubricant off parts. It can be used with care on plastic parts. Denatured alcohol can also be used as a solvent and usually does not harm plastics. Do keep in mind that all solvents are flammable. Also remember that all solvents may be harmful to painted surfaces and the more aggressive the solvent, the more likely that it will attack a painted surface.

"To remove frozen parts I can highly recommend Kano Laboratories Aerokroil. This is a really good penetrating oil. For example, it has allowed me to remove exhaust manifold bolts without breaking or stripping them. You don't often need it on a record player, but if you do, it is invaluable. For example, I encountered a changer where the household cat had 'marked' the turntable. Male cat urine is particularly corrosive and the Aerokroil enabled me to remove the turntable. Once I got the table off, I used crocus cloth to polish the shaft. You can usually find crocus cloth at your neighborhood hardware store.

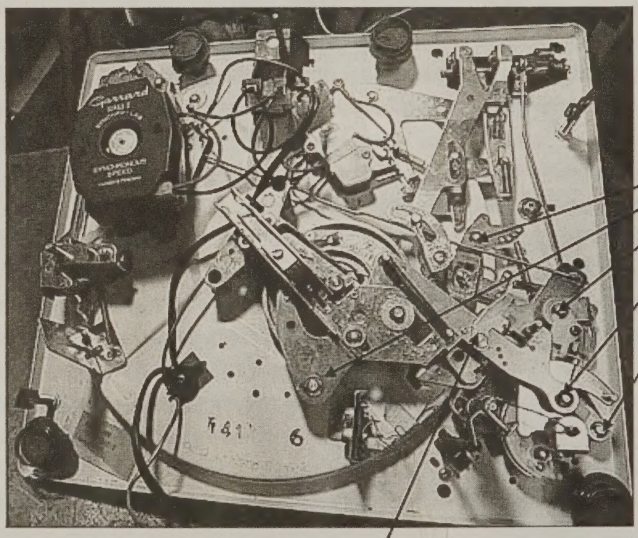
"For lubrication I use a quality 'moly' lubricant (synthetic grease) where grease is required. Molykote 33 works well for most surfaces. I have found this to be a long-lived product. It should be noted

that I have had bad experience with the 'white moly' in those little tubes that are sold by electronics suppliers – it gets hard in a few years. Where extra viscosity is required, in tone arm dampers, for example, Molykote 111 is hard to beat. You will need to use it sparingly and some experimentation for the correct amount may be required. 10W automotive oil works well for things like tone arm pivots, idler wheels, and motor bearings. 30W automotive oil works for things like turntable bearings motor bearings and various pivots.

"DeoxIT is useful for electrical connections like cartridge head shells, muting switches and power switches.

"I strongly advise finding service literature if possible. This will usually have detailed construction drawings and a list of adjustments. Service literature is widely available on the web and it is hard to beat the old Sams Photofacts that turn up at swap meets. I still find it easier to hold a sheet of paper than look at a laptop screen. Plus, you can make notes on paper. The only caution I have on this topic is that web sites with service literature can have a whole lot of "download this" or "download now" buttons. Be very careful of these. That "free PDF viewer" will download a whole bunch of evil spyware and your computer already has a PDF viewer.

"With your 'new' changer on the bench, what are you likely to encounter? As I mentioned before, lubrication will likely have turned to goo at best, but more likely will have frozen things completely. Rubber products, such as idler wheels, will have become hard and not provide the required traction. Plastic parts may have become brittle, so handle with extreme care. Plain 'ol dirt and grime will be everywhere and can gum up the works in addition to looking bad. Drive belts will either be very droopy or have turned to sticky goo. In some changers, particularly 50's vintage Gar-



rard units, metal parts will be covered with a white corrosion.

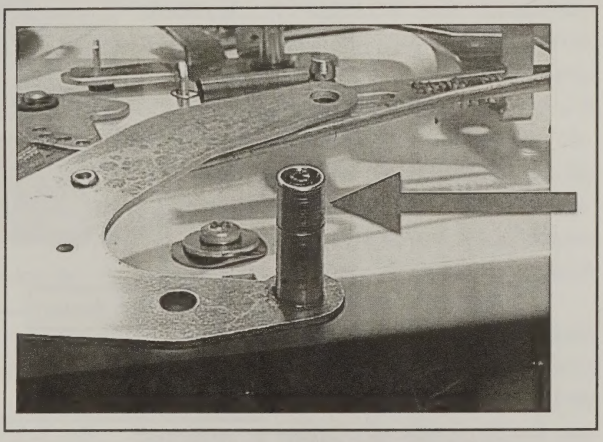
"The first step is to remove the changer from the mounting. Usually this involves flipping the keeper on the bottom 90 degrees. On Dual changers, the transit/mounting screw has a short section with no threads that will allow it to be tilted to clear the bottom stop.

"The next step is to take lots of photographs. These can be invaluable when you go to put things back together. You want to get good close up detail as well as a good overview shot. You will need lots of light and I have used clamp on trouble lamps at times. You can even use your flashlight to illuminate the dark corners. If you have a tripod, use it – you want the photos to be sharp. If you don't have tripod, brace your elbows to hold the camera steady. If you don't have a dedicated camera, the camera on most phones these days is quite good. I have found it helpful to take additional photos as I go along. The few minutes lost in setting up the shot can pay big dividends when you need to put things back together. It also doesn't hurt to make notes as you go.

"With your photos taken, you can now proceed with the actual work. Changers will need to be taken apart, the dead lubricant and corrosion cleaned, the parts re-lubricated and reassembled. I would suggest working one area and one assembly at a time. I try to complete an area in one sitting - I am of an age that I tend to forget where things came from if I am away for too long.

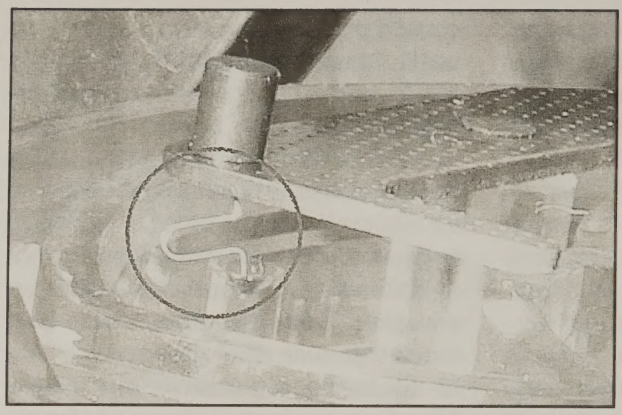
"When removing small clips, be very careful. They tend to flip off and can go flying and can be well neigh impossible to find. Put small parts, clips, screws, washers and the like in an Altoids tin to keep track of them. I use multiple tins to segregate fasteners for the various assemblies.

"The frozen pivots will likely require the use of the heat gun to soften the set up lubricant. Use the heat gun with care because you don't want to discolor paint or soften any nearby plastics. Use just enough heat to soften the grease. I have found that quite often the parts will have to be hot enough to raise a blister. Therefore, use leather gloves and/or pliers. You can fashion a heat shield for plastics from an old tin can. For example, if you can't remove the pad from a turntable, a can with both ends removed can be used to protect the pad from the direct blast of the heat gun and still allow heat on the center bearing. I have been surprised at how much heat will be required on some changers. Joints with a lot of corrosion and rust can be removed with aid of the Aerokroil. On rare occasions, it may take heat as well as the Aerokroil.



Remember to clean and lube all cam rollers

"Once the part has been removed, it will have to be cleaned. Q-tips dipped in solvent can be used to clean up inside the bushings. Q-tips can also be used on surfaces. Shop towels or old cotton socks



Watch for tiny springs as found in the Dual changer

worker on the assembly line only had a few seconds to apply that grease so, often a lot was applied. Limit your application to the surfaces that actually see contact.

"By the way, while you have things apart, don't forget to free up those little cam rollers. These will require some patience. It will take several applications of a couple of drops of Blue Shower or a good soak in lacquer thinner to flush out the dead grease. Once it is dry, work in Molykote 33 with the tip of your finger.

"In the way of general cautions:

"Beware of left hand threads such as on one side of the tone arm pivot of a Dual changer. This is on the same side as the tracking force spring.

"There are a lot of small parts in a record changer so pay very close attention as you take things apart. As an example, there is a very small, and vital, hairpin-spring on that plastic cam wheel on a Dual changer. It is between the wheel and the shut off gate. Other changers have small springs as well.

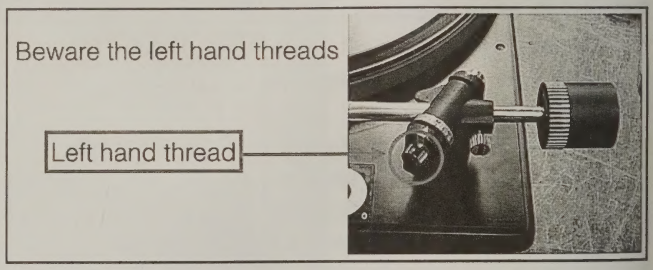
"Whenever you encounter a spring, use caution. Because they are usually under tension, they can really fly into a dark corner of your shop when released.

"Sometimes small parts are hidden or inside things. For example, there is a

can be used as rags. Blue Shower is usually an effective solvent and the red tube helps get it inside bushings. For really serious grime and old grease, use lacquer thinner. Just don't forget the gloves and work in a well-ventilated area. Surface corrosion can be cleaned with crocus cloth. For serious surface corrosion, fine sandpaper may be required. If you desire, a product such as Tarnite can impart an actual shine.

"As I mentioned before, on plastics do not use lacquer thinner or Blue Shower. Paint thinner or alcohol are in order. A Q-tip can be used to get down into crevasses.

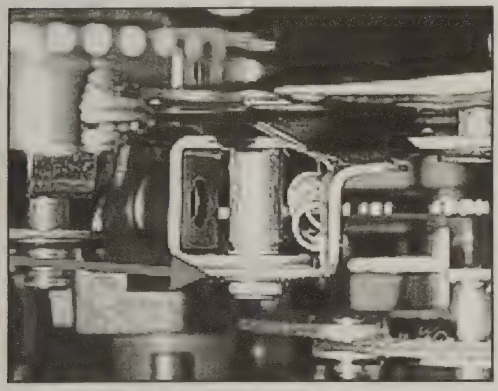
"A thin layer of lubrication is required before things are reassembled. A Q-tip makes a good applicator for the inside of a bushing. It can also be used on the mating shaft for the same purpose. Surfaces of cams should also be lightly coated with grease. In this case I am thinking of the Molykote 33. It should be kept in mind, that with lubrication, more is not necessarily better. A thick blob of grease will attract and hold dust and grime. If there happens to be a lot of grease that was applied at the factory keep in mind the



small ball bearing in the bottom of the spindle on a VM changer.

"The ball bearings on older Garrard changers are not captive. This applies to the RC80, RC88, RC98, Type A, etc. The bearings are in a spacer but are not captive. This applies to the turntable bearing and the tone arm bearing. Whenever I am dealing with these bearings, I put a pie pan under the changer to catch them. They are very small and you will never find them. To put them back, I use a small dab of grease to hold them while I reassemble things.

"That stack of washers on an idler wheel is, in fact, a stack of shims to set the proper height. Pay attention to thick-



Replace old metal washers with nylon for improved performance

ness and location. (sometimes, thickness is color coded)

"Not all screws are captive and will fall out when you loosen them.

"Pay attention to orientation of spring washers and clips. Sometimes a little common sense may be required. I have encountered some that, so help me, were installed upside down. This may have been done at the factory or by a previous mechanic. In one case, I saw one drawn upside down on a Sams Drawing.

"Motor bearings can be cleaned. Take the motor apart and soak the bearings in lacquer thinner. Once the thinner has evaporated, the felt washers can be impregnated with some 10W oil. When you take the motor apart, pay attention to the stator orientation. Just about any motor can be reassembled with the stator upside down. In which case, the motor will run backwards. I suggest marking the stator with an up arrow with a Sharpe marker.

"A Sharpe marker can also be used if you need to make timing marks. This can be useful on the actuator that is mounted on the bottom of a tone arm shaft, for example.

"Mind the tone arm wires. They tend to be very small and very fragile. I recommend carefully unsoldering them from the under table terminal or jack. Turntable wire is hard to find as a replacement. I happen to have some from a long time ago and I have also found the conductors in the silver satin telephone wire can be carefully extracted and will do for tone arm wiring.

"And don't forget your camera as you go along.

"In some cases, I have replaced steel washers with nylon washers to reduce friction.

"When doing all of this work, and when testing the changer, I remove the stylus tip from the cartridge to prevent damage. If I have the old tip, I will use that for the initial testing. Whenever I do a changer, I replace the stylus.

"In addition to the stylus, you should plan on replacing all drive rubber parts such as idler wheels, turntable belts and motor mounts. For replacements, I can highly recommend http://www.thevoiceofmusic.com. Our friend, Gary Stork, has a quite remarkable as-

(Continued on page 14)

The Loss and Return of My Record Changer

By Steve Enzer

When I was a kid in the 1950's, my family had a typical RCA console radio/phono in the living room. The phono was a 78 RPM changer. By the early 1960's, the 78's had been replaced by the modern LP and 45 style records. Rather than replacing the old console, my dad purchased a Garrard Type A changer and wired it into the console's amp. Though the changer had a stereo cartridge, we could only use one of the two output leads.

Custom cabinet for my audio system. The stained glass in the doors was designed and built by Flora Enzer.

Over the next few years, my dad got a Heathkit AA-100 integrated amplifier, followed by the matching AM/FM turner. I assembled both units. With my dad's help, I also built a pair of speaker cabinets to house some Jenson coaxial speakers. We finally had a true stereo.

That stereo equipment stayed in the family for many years, moving with me when I got married, and finally going to my son when I upgraded to more modern equipment. Finally, in the late-80's, well before I began collecting vintage electronic equipment, it was packed up and donated to Good Will.

When I finally became interested in antique radios and other old electronic equipment, I began to deeply regret disposing of my old stereo set. Over the years I managed to reacquire both the Heathkit amp and tuner, and also a Garrard changer, all identical to the ones I used to own. The Garrard sat on a shelf for a few years. It was cosmetically in very good condition for its age and the mechanism looked clean, but I was smart enough to avoid the temptation of trying it out. Plus, I had neither the experience nor the time to get into record changer repair.

Finally I decided it had sat for long enough and I took it to John Reinicke for an overhaul. It was a good thing I did since it had more problems than I could have imagined. If you want a rundown

Interior view shows the Carver receiver, NAD tape and cassette players, and Garrard Type A changer on the left. The Technics turntable is on a slide-out shelf at the right. The drawers are for cassette tapes and CDs. .Some day the Garrard changer should be moved to the slide-out shelf for easier loading.

on what John went thru to restore it, go back and read John's *The Shop #92* in the Winter 2015 issue of the *Chronicle*.

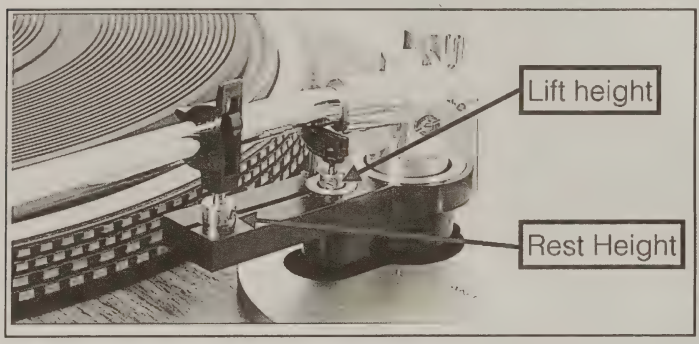
After John worked his magic on the Garrard, I once again had a well-functioning record changer. An eBay search resulted in the acquisition of a Garrard 45 adapter spindle in its original box. I certainly didn't want to put it back on the shelf, so I had to decide where to use it. I have a stereo receiver in my

(Continued on page 20)

(The Shop, continued from page 11)

sortment of parts available on his web site.

"For the initial testing, I will carefully cycle the machine by hand. That way I can feel if anything is binding or stop if something goes astray. Once you are convinced all is working OK, you can move on to adjustments. All should be checked, but you may find some that are fine as is unless you messed with it.

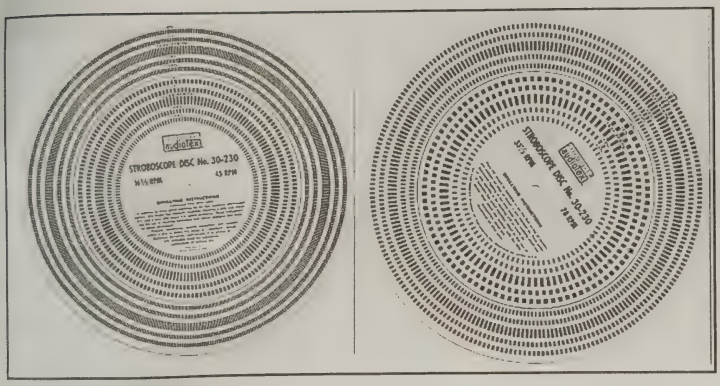


Tone arm adjustments on a Pioneer changer

"Set the arm lift height such that it clears the record on the spindle by about a quarter inch, or about 6 mm if you prefer. This adjustment usually can be found on the inside of the tone arm or on the end of the lift rod.

"The stylus set down should be just at the bottom of the lip on the edge of the record. If you look at a record, you will see that the label and edge are raised above the groove surface. That way, when records are stacked on a changer, the groove surfaces don't touch. If the set down is too far in, the starting may be missed and if it is too far out it might miss the record or land on side of the edge lip. This will cause the stylus to skate down the lip and pass a couple groove passes with an annoying sound. This adjustment can be a screw on the tone arm pivot or a screw that can be accessed through a hole in the top deck of the changer. This adjustment is usually quite touchy – a small turn will make a big difference.

"The stylus pressure should be set toward the high side for the particular stylus. This will insure that the change cycle trip will operate adequately. In addition, higher tracking forces, within reason, will insure a good contact between the stylus tip and the sides of the groove and the result will be better sound. If the tracking force is too low either the changer will stick on the cycle trip lever or you will hear "shatter" which is an annoying sort of crackling sound on loud passages. The older the changer, the higher force required. Changers from the early to mid 50's will require about 5 grams tracking to work well. By the early 60's it was down to 3 grams and by the end of the 60's tracking at 1 gram was reasonable. So if the cartridge is rated for, say, 1.5 to 3 grams, I would set it to at least 2.5 grams. I think you will find this works on high quality turntables as well. A particular cartridge might be rated to track at ¾ of a gram to 1.5 grams but I think you will find that on most records it will sound better at the 1.5 gram set point. On older changers, the arm is counterbalanced by a spring and tracking adjusted with slots or a screw that moves the spring attachment point. On newer changers, the arm has a counter balance. The spring is set to zero and the counterweight is adjusted to just balance the arm. A spring is then set to the proper tracking force. On some, the counter weight has a settable scale. The arm is



Strobe disks for the four standard speeds

actually broke the plastic housing for the tone arm pivot.

"And this brings up a point. Sometimes it will be necessary to repair a part and that does, indeed, require patience and some ingenuity.

"In the case of the broken arm pivot, I was able to cut small sheets of fiberglass cloth for reinforcement. I glued these to the plastic with some high strength contact cement.

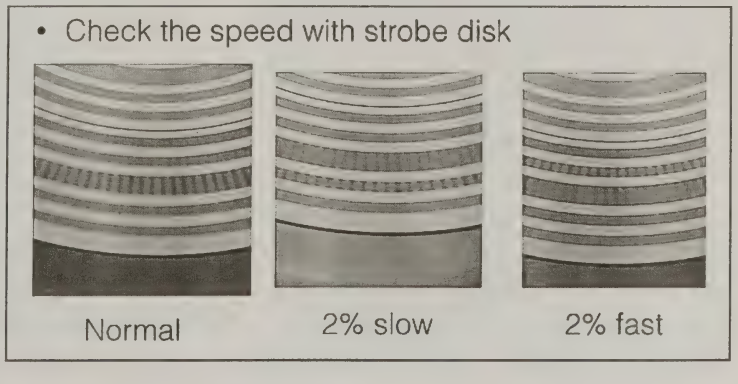
"I was able to repair a Dual head shell with high strength epoxy with a couple pieces of steel wire for reinforcement. The wires were made from small brads that had the head and points cut off and the end filed.

"Another newer Dual had a plastic lever that cracked such that it slipped on its shaft. This, I must add, I think is a design problem. To fix the problem, I used the high strength contact cement to glue the shaft back on. To further reinforce the really small joint, I used my Dremel tool and a very small drill to make a hole through the plastic and metal shaft. I then glued a bit of steel wire (yep, a brad) in the hole to act as a locking pin.

set to balance and the scale zeroed at that point. The counter weight is then rotated to the desired tracking force.

"Newer changers and turntables have an anti-skating adjustment. Skating torque is dependent on tracking force, relative humidity, record composition, temperature, and stylus configuration. I would recommend setting this adjustment to its minimum. I can't hear the difference, and rather doubt you can either. Of course, feel free to experiment.

"Some adjustments can be critical and it may not be obvious why. For example, I encountered a Pioneer turntable that the lift height and armrest adjustments were critically interdependent. On this changer, when the arm returns to the rest, the arm does not set down. The lift height should be the same or ever so slightly below the rest. On this particular unit, a previous mechanic assumed that the arm would set down and adjusted the rest accordingly low. When the arm was locked in the rest for transport, this

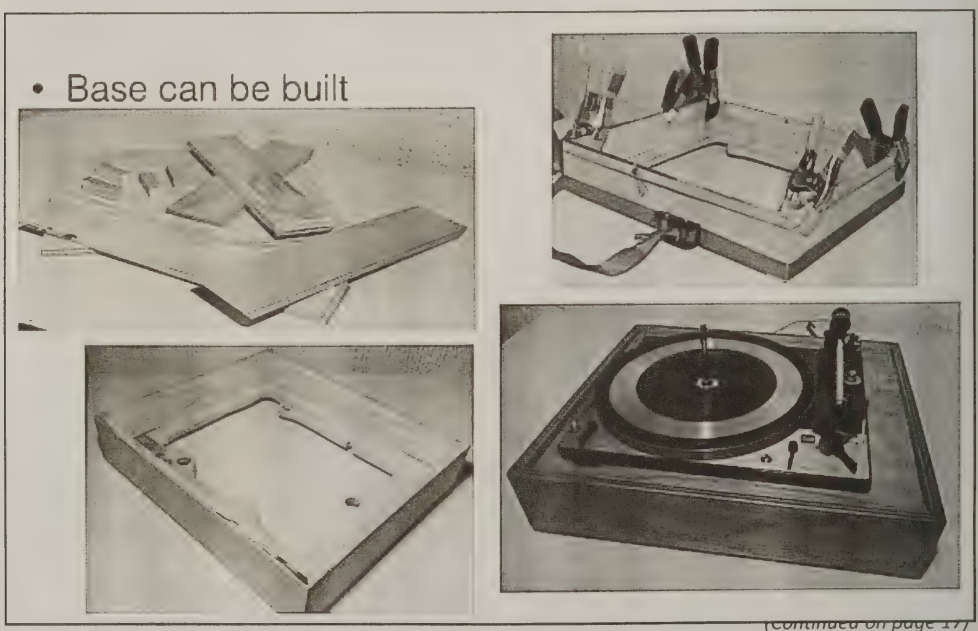


"I encountered a Garrard type A where someone had cut off an actuator pin from the lever attached to the bottom of the arm. Thus, there was no way the changer would cycle at the end of a record. I think the idea was to use much too low tracking force. For a repair, I used the Dremel to grind off the stub of pin. To replace the pin, I used a #2 machine screw, nut and a couple of washers. I cut a short piece of small brass tubing and put it over the exposed threads to act as a roller. To retain the roller, I used another nut just threaded onto the bolt, but not tight on the roller. A dab of ladies nail polish served to lock the nut in place.

"Old Garrard changers use an resistor-capacitor network across the on off switch to reduce the pop you might hear from the speakers when it shuts off. They all use paper caps and, as us old radio types know, those paper caps will have gone leaky. These networks will get quite hot when the changer is off and I have even seen one smoke. To repair these, carefully use the heat gun to melt the encapsulation and remove the network from the housing. The housing is brittle and thin, so care is required. A new resistor and modern cap can be installed in the housing and then sealed with RTV – clear silicone caulk.

"And, if you are so inclined, you can even make a changer base. To figure out the required cutout I have usually been able to find an old base for a template or I have a few changer templates in my collection. On at least one occasion, I had to 'start from scratch'. For that I took measurements from the changer and transferred my measurements to a sheet of cardboard. I cut out the cardboard with an exacto knife and used that to check. After a couple of tweaks, I had a template.

"Once you get through all of this, you will be ready to enjoy your records. If you spent your time on an actual record changer, you can put a stack of records on and enjoy music right through the evening meal and afterwards. With a



(continued on page 17)

good selection of music, I think you will find this to be quite pleasant.

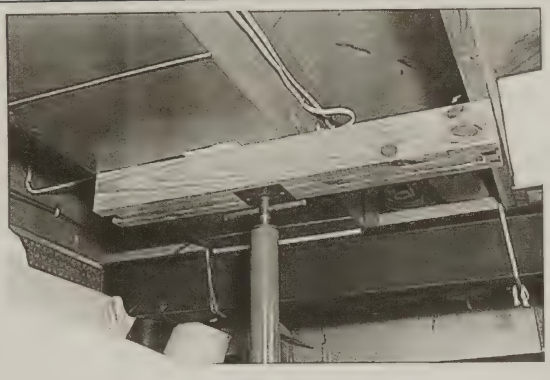
"Your record player can be connected directly to your old tube type receiver or amplifier. This, of course, gets you the 'full Monty' and you can enjoy the warm, full sound of tubes and an analog recording.

"Older solid state receivers also sound very good and your changer will connect directly as well.

"If you want to connect to a modern surround sound system an external pre-amp will be required. Pre-amps are readily available on line and you really don't have to spend a fortune to get a good one. However, if you want to spend a fortune, knock yourself out.

"If you want to transfer one or more of your recordings to digital you can use a USB sound card. These, like pre-amps, are readily available on line and you don't have to spend a fortune to get one. A sound card will require the use of a pre-amp. If you are using a solid-state receiver, the tape output will quite happily drive the sound card. However, if you are using a tube type receiver, it will not happily drive a sound card. Sound cards typically have an input impedance on the order of 47 K Ohm. Tube type equipment typically requires a load on the order of 470 K Ohms as a minimum – a ten to one mismatch.

"One last thought -- unless your house is on a slab you will find that if someone walks across the floor in front of your record player, the vibration will cause the tone arm to skip all over the place. It is really quite inconvenient to constantly tiptoe past the changer. For the changer in my living room, in the basement directly below the cabinet with the changer, I have placed a floor jack from the first floor joists to the concrete basement floor. On top of the jack, I used three 'sistered up' 2 x 4's that are cut to just over 4 feet. These will span three floor joists and with this in place, you can jump on the living room floor without perturbing the records. In a second floor bedroom I have mounted the changer on a shelf that is secured to the wall studs. This also solves the floor vibration problem quite nicely.



Use a floor jack and 2x4's for support

Stabilize the floor to avoid stylus bounce

"I hope you have found this interesting, helpful, and maybe a little inspiring. Do y'all have any questions?"

I sat back in my chair. "Wow, Art, that is quite a presentation!" I couldn't help giving him some applause. At this point we both heard that I was not alone in my applause and only then did we notice that two customers had walked in and were just standing in the shop quietly taking it all in.

The younger of the two looked to be in his mid 20's and spoke up. "I stopped in because I saw the record player in the window and I was walking by because I heard about your presentation at the

library. I guess I am now planning to stop by the library on Wednesday. Actually, I do have a question."

Art grinned and walked over and shook hands. "Well hello! I am Art Miller and this is my friend John from the Michigan Antique Radio Club. I am pleased to meet you two. And you are?"

The older gent responded first. "I am Ray Dayton and I also heard about your presentation at the library."

The younger gent went next. "I am Sheldon Mulhouse."

Art smiled. "And your question Mister Mulhouse?"

Sheldon responded. "Suppose I decide to take on one of these changers. What might you recommend for a beginner?"

"That is great, Sheldon!" Art was clearly pleased. "I would get started with a V-M. They really do have a sophisticated design that is elegant in its simplicity. V-M changers can be had at very low prices and you can experiment and get your feet wet without breaking the bank. And when you get it going, you will find that it is quite adequate for the job. If you want to move your budget up a bit, Garrard AT series changers aren't too bad to work on. The older Garrard changers really are a marvel of complexity and not necessarily a good starting point unless you really like a challenge. I would avoid the late 70's Garrard changers simply because you will find so many parts glued by the lubricant. Dual changers are also quite straightforward to work on and parts are available on line. However, they can be expensive. Dual changers have quite a fan base, so if you want to sell it when you are done, it can be worth the effort. Pioneer and Technics turntables can be downright excellent and the mechanisms relatively straightforward to clean and lube. They are subject to the same problems with lube, so don't just try them out. My only caution is that newer turntable and changers tend to have a lot of electronics. Open filter caps and the like are easy but they are also full of proprietary integrated circuits that haven't been made in decades. I have found replacements on line but they tend to be from China and my experience with them has been 50-50 at best.

"Collaro changers are also quite good, but tend to be a bit more complex. They also have two idler wheels, one for the platter and one for the change mechanism. The advantage is the change cycle time is the same regardless of platter speed. The disadvantage is there are two idler wheels to replace. These were used in thousands of Magnavox console stereos back in the day.

"BSR was noted for low cost changers and they are reasonably easy to fix as well. However, they tend to be full of plastic parts that aren't particularly sturdy. So approach these with caution.

"Of course, there are other brands as well – some expensive, some reasonable. I think my techniques will work in conjunction with your enthusiasm, ingenuity and patience."

Art offered his two guests a cup of coffee and after turning on the lights and turning off the projector, gave them the 'cooks tour' of his shop.

I just sat back with my coffee and watched the show. I figured I would ask Art about the FBI after the two visitors left.

Rebuild Cartridge of a 78 RPM Record Player

By Wayne Newhart

They all failed. The needle cartridge used in the old 78 RPM record players used a crystal (Rochelle Salt) that would, over time, absorb moisture and dissolve into a mush. Here is one way to rebuild the needle cartridge.

Drill out the rivets holding the cartridge together. Separate the two halves and discard the "mush" looking material. Save the terminal board and the needle holder and maybe some of the rubber material.

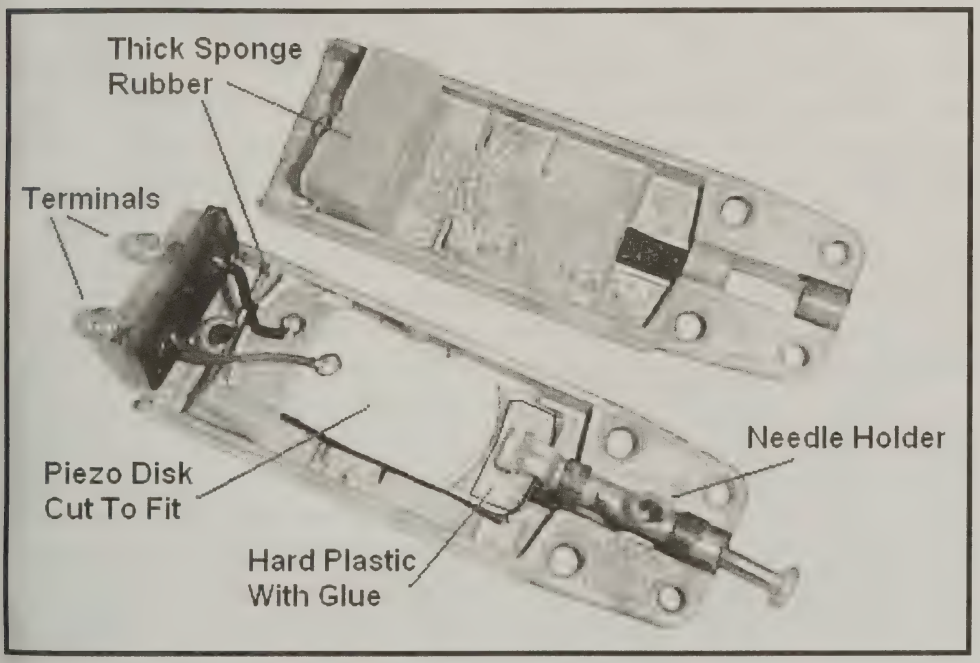
Obtain a Piezo Disk of a convenient size. It is okay to cut it to fit. (These disks can be found in junked phones, buzzers, greeting cards etc.)

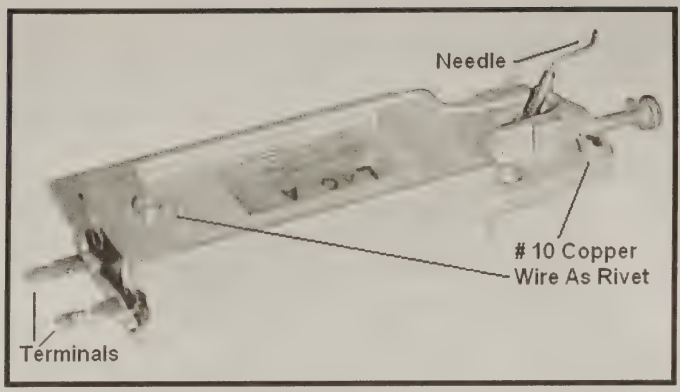
The red and black rubber bands around the needle holder were okay. If missing, use a little dab of Silicone Rubber Sealant in place of the rubber bands.

I used two pieces of hard plastic cut from a medicine bottle. Epoxy glue one on each side of the brass disk. Epoxy glue the needle holder to it. (Use 5 minute glue, let dry ½ hour.)

Solder the wires from the piezo disk to the terminal board. Use care. It is easy to break the red wire from the ceramic material. This end of the disk needs to be held with care, but firmly. A very thick layer of sponge rubber will work. Assemble, and hold together with "Scotch" tape. Install a needle. Measure the voltage output at the terminals. When the needle is scratched, it should measure about 3 volts, max, using an oscilloscope. Otherwise, install the cartridge and try it. A good, loud sound is what you want.

When you are satisfied with the cartridge, you might wish to assemble it





with rivets. (The tape will suffice in many cases as the assembly screws might hold it together.) I used # 10 wire as rivets and compressed the ends of the wire in a vice. (The wire was a little large. I ground down the diameter of the wire.)

In need of a needle? Find a thorn tree with long needles. Cut several and let dry.

Editor's Note: We wish to thank the author and Fred Prohl, editor of The Indiana Historical Radio Society Bulletin, *for permission to reprint this article. Also, note that internet sellers offer decent replacement needles.*

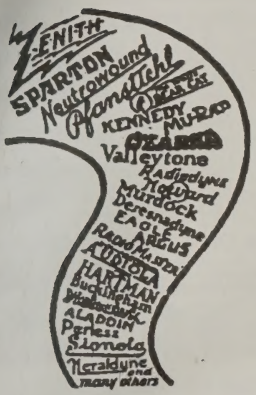
(Record Changer, continued from page 13)

basement with decent speakers, but I don't use that setup very often, and I wanted to enjoy the benefits of the record changer as much as possible. My "good" audio system is in my living room, housed in a cabinet I designed and had custom-built by a cabinet maker who is a friend. The equipment has changed a bit over the years, but currently consists of a Carver Receiver (I believe the first solid-state receiver Carver manufactured, with no model number on either the unit or in the instruction manual), a NAD model 5240 CD player, a NAD 6300 cassette tape deck (which John Reinicke brought back to life for me), and a Technics SL-5 turntable. The speakers are a pair of RTR Series IV model TVD units.

The Technics turntable is what actually replaced my original Garrard Type A. It uses a linear tracking mechanism to position the cartridge, rather than a traditional style tone arm. While I know audiophiles scoff at such designs, it actually works quite well in my humble opinion. Among its top features, it is nearly impossible to knock the stylus out of the track, no matter how hard you bounce on the floor. You can even pick it up and tip it back and forth and it will not skip a groove. And with a belt drive and good vibration damping, there is no turntable rumble even at high volume levels. So the Technics was staying.

I finally decided that by repositioning some of the equipment, I could squeeze in the Garrard changer and use both it and the Technics turntable. Since the Carver receiver has only a single phono input, I added an external switch to select which phonograph feeds the amp.

So how well do I like the arrangement? The answer is that I have been really enjoying it. For serious listening, I still use the Technics turntable. But for casual use, nothing beats putting a stack of LPs on the Garrard changer and letting them play. Yes, there is more turntable noise, and I have to tread very lightly to keep the needle from jumping, but it is a joy seeing that great mechanism do its thing and drop disk after disk on the heavy platter, producing hours of continuous music.



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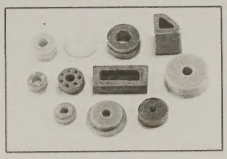

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Activities: Flea Market, Equipment Contest, 50/50 Drawing, Seller's Drawing, Silent Auction, and Donation Auction, and special presentations.

Contest Categories:

All collectors have items that are special to them. We encourage you to show them off at our meets, and this the contest is the place.

- **Chrome and Nickel Radios:** Any electronic device using chrome or nickel plating for decoration.
- **Ugly Radios:** We have all seen radios where either design or circumstance makes them painful to look at. Show us yours!.
- **The Open:** Any vintage electronic item including radios, televisions, test equipment, calculators, and games.

Host: Rob Murrell. Please send table registration forms and fees to Rob at 2420 Princeton, Berkley, MI 48072. You will receive a reservation confirmation. For information about the club or meet call Mike Dale at 734-439-0834.